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EXAMINER	
YEN, ERIC L	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/806,662	KIKUMOTO, TADAO	
	Examiner	Art Unit	
	ERIC YEN	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 May 2010*.

2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50,52 and 53* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-50, 52-53* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the Office Action mailed 2/18/10, applicant has submitted an amendment filed 5/12/10.

Claims 1, 37, 38, 52, have been amended. Claim 51 has been cancelled. New Claim 53 has been added.

Response to Arguments

1. Applicant's arguments with respect to claims 1, 37, 38, and 52, have been considered but are moot in view of the new ground(s) of rejection.

The examiner previously contacted applicant regarding an examiner's amendment deleting the limitations previously rejected under 35 USC 112-1st and 2nd paragraphs ("relative to other frequencies of each of the frequency bands") and indicated that the claims would be allowable after the limitations of cancelled claim 51 (previously objected to as being allowable but dependent on a rejected claim), directed to "setting modulation levels ONLY at the fixed center frequency of each of the frequency bands" was amended into the independent claims.

This was prior to an updated search that led to the discovery of the references by Kikumoto (the inventor of the present application) et al. (US 6,323,797 and US 6,201,175) which taught material that reads on the amended limitations of Claim 1. While the inventor of the present application is one of the named inventors in the

references, the inventive entities are different. Furthermore, the references were published in 2001 which precedes the US filing date by over 1 year (and the Japanese priority date as well). Therefore, the references are applicable as prior art in a rejection under 103(a) for having a prior art date usable under 102(b).

Kikumoto et al. (US 6,323,797), hereafter Kikumoto, teaches where modulation of a signal is performed by a "combining section" (col. 2, line 40 - col. 3, line 12) in order to perform an audio signal conversion involving interpolation via a modulation. The modulation described is applied to "sine waves" of "center frequencies" [reads on "modulating a level of a signal of each of the frequency bands based on the modulation level set in the setting means" since the sine waves are signals belonging to the center frequencies which have a corresponding frequency band]. The only modulation step described in this section is the modulation of these center frequency signals, and therefore the teaching is where modulation is applied only to the center frequencies and the levels are set only at the center frequencies as claimed.

Cano and Choi teach the application of modulation generally in a manner that doesn't modulate only center frequencies. Since Kikumoto teaches a different form of modulation performing the same function (signal manipulation), one technique can be substituted for the other such that the combination reads on the limitations of the amended claims.

Therefore, a new prior art rejection based on Choi, Cano, and Kikumoto, is applied below and the previously indicated allowability of the limitations of Claim 51 is withdrawn.

Kikumoto (inventor of the present application) et al. (US 6,201,175) teaches multiplying assorted items of center frequencies but it is multiplied by original waveform values and so the modulation levels are not set based on formant characteristics and formant control information (which is frequency domain information) and so there is no double patenting issue with Claim 8 of Kikumoto et al. (US 6,201,175) because the modulation based on control information is directed to something patentably distinct relative to independent claims of US 6,201,175.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Michael Taveira on 5/24/10.

As per Claim 1, "relative to other frequencies of each of the frequency bands" is deleted from line 9.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-50, 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi (US 2003/0014246), in view of Cano et al. ("Voice Morphing System for Impersonating in Karaoke Applications"), hereafter Cano, Gibson et al. (US 6,336,092), hereafter Gibson, and Kikumoto et al. (US 6,323,797), hereafter Kikumoto.

As per Claim 1, 37, and 38, Choi teaches a vocoder system (and corresponding method) comprising: formant detection means for analyzing a first tone signal to detect formant characteristics of the first tone signal ("voice signal of the subscriber… detect the spectrum parameter", paragraph 46; "spectrum parameter… are detected", paragraph 47; where the spectrum of a signal comprises, among other things, the formants of a voice)

tone signal input means for inputting a second tone signal that corresponds to specified pitch information ("selects the kind of the effect... converts the spectrum parameter… with reference to the loaded spectrum parameter…conversion of the spectrum parameter... height of voice", paragraph 47)

setting means for setting modulation levels based on the formant characteristics and formant control information with which the formant characteristics detected by the

formant detection means are changed ("selects the kind of the effect... converts the spectrum parameter... with reference to the loaded spectrum parameter...conversion of the spectrum parameter... height of voice", paragraph 47; "modulating", paragraph 38; = where interpolating one part of the spectrum where the input and target are relatively similar necessarily has a different modulation set relative [i.e. compared to] other modulated frequency values/levels in other frequencies where the difference between the input and target are different.)

modulation means for modulating a level of a signal based on the modulation level set in the setting means ("modulating", paragraph 38).

Choi fails to teach the tone signals are musical tone signals.

Cano teaches the tone signals are musical tone signals ("target singer", Introduction).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi to include the teaching of Cano of the tone signals are musical tone signals, in order to extend voice changing to singing applications, as described by Cano (Introduction).

Choi, in view of Cano, fail to teach division means for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed, where the modulation levels are set only at the fixed center frequency of each of the frequency bands, and where modulating the level of a signal modulates levels of each of the frequency bands, and where the frequencies are of each of the frequency bands.

Gibson suggests division means for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed ("signal is split into two equal-width frequency bands... gain compensation... transformed ", col. 9, lines 44-65; where the defined frequency bands naturally cover a range of frequencies, which has a frequency in the middle of the range)

where the modulation levels are set at the fixed center frequency of each of the frequency bands, and where modulating the level of a signal modulates levels of each of the frequency bands, and where the frequencies are of each of the frequency bands ("signal is split into two equal-width frequency bands... gain compensation... transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; where the gain compensation and transformation is a form of modulation, and to determine the target voice characteristics and the necessary transformations, an analysis of the target voice signals in the corresponding frequency bands is obvious/necessary).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands

was known in the art. One of ordinary skill in the art could have substituted Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

Choi, in view of Cano and Gibson, fail to teach that the modulation levels are set only at the fixed center frequencies.

Kikumoto teaches the modulation levels are set only at the fixed center frequencies ("combining section, the sine waves of said center frequencies of each of the frequency bands... are modulated", col. 2, line 40 – col. 3, line 17, especially col. 2, line 64 – col. 3, line 6; where Kikumoto teaches an alternative audio signal modulation technique that operates by modulating only the frequencies of the center frequencies of different frequency bands).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to perform a **simple substitution** of Choi's modulation technique which at the very least processes all frequencies in the frequency band of the audio signal, **which differs from the claimed device** by the **substitution of** modulation performed by only modulating center frequencies. Kikumoto teaches **the substituted components** of modulating only center frequencies **were known in the art. One of ordinary skill in the art could have substituted** Choi's modulation of all frequencies

with Kikumoto's modulation of only center frequencies **to obtain the predictable results** of a voice changing system that modulates audio signals.

As per Claim 2, Choi fails to teach wherein the format detection means comprises a filter.

Gibson suggests wherein the formant detection means comprises a filter ("signal is split into two equal-width frequency bands... gain compensation... transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; where division into frequency bands involves filtering an input spectrum).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that

processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

As per Claim 3, Choi teaches wherein the formant detection comprises a Fourier transform ("spectrum parameter… are detected", paragraph 47; where a spectrum is a frequency domain representation obtained by applying a transform, which is commonly a Fourier transform).

As per Claims 4-6, Choi, in view of Cano, fail to teach wherein the division means comprises a filter.

Gibson suggests wherein the division means comprises a filter ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; where division into frequency bands involves filtering an input spectrum).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted**

components of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

As per Claim 49, Choi, in view of Cano, fail to teach wherein the filter comprises a digital filter having frequency characteristics defined by a plurality of filter coefficients and wherein the setting means sets the modulation levels, free of changing the filter coefficients.

Gibson teaches the filter comprises a digital filter having frequency characteristics defined by a plurality of filter coefficients and wherein the setting means sets the modulation levels, free of changing the filter coefficients (Figures 7-8, low pass and high pass filters; "method ... modify the original spectral envelope", col. 7, line 18 – col. 8, line 28;, where all filters including the low and high pass filters at least obviously are defined by their filter coefficients [based on mathematical theory], and also the filters being modified by the methods are applied in the "modify... spectral envelope" blocks which are subsequent processes independent of the high and low pass filters themselves, and so the high and low pass filter coefficients are not changed).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

As per Claim 50, Choi, in view of Cano, fail to teach wherein the filter comprise a digital filter having frequency characteristics defined by a plurality of filter coefficients, and wherein the setting means sets the modulation levels while the filter coefficients remain constant.

Gibson teaches wherein the filter comprise a digital filter having frequency characteristics defined by a plurality of filter coefficients, and wherein the setting means sets the modulation levels while the filter coefficients remain constant (Figures 7-8, low pass and high pass filters; "method ... modify the original spectral envelope", col. 7, line

18 – col. 8, line 28; see Response to arguments, where all filters including the low and high pass filters at least obviously are defined by their filter coefficients [based on mathematical theory], and also the filters being modified by the methods are applied in the "modify... spectral envelope" blocks which are subsequent processes independent of the high and low pass filters themselves, and so the high and low pass filter coefficients are not changed).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

As per Claims 7-9, Choi, in view of Cano, fail to teach wherein the division means comprises a Fourier transform.

Gibson suggests wherein the division means comprises a Fourier transform ("signal is split into two equal-width frequency bands... gain compensation... transformed", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; "spectral", col. 9, lines 32-43; where division into frequency bands involves filtering an input spectrum).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

As per Claims 10-18, Choi fails to teach wherein the setting means sets the modulation levels by interpolation processing based on the formant characteristics and the formant control information.

Cano teaches wherein the setting means sets the modulation levels by interpolation processing based on the formant characteristics and the formant control information ("target singer", Introduction; "interpolated", Section 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi to include the teaching of Cano of wherein the setting means sets the modulation levels by interpolation processing based on the formant characteristics and the formant control information, in order to extend voice changing to singing applications, as described by Cano (Introduction).

As per Claim 19-23, Choi teaches wherein the setting means sets modulation levels based on pitch information, the formant characteristics, and the formant control information ("pitch… pitch period", paragraph 35; "converting… the pitch period", paragraph 17).

As per Claims 24-27, Choi teaches wherein the setting means sets modulation levels based on musical interval, the formant characteristics, and the formant control information ("pitch… pitch period", paragraph 35; "converting… the pitch period", paragraph 17; where a "period" is an interval, and the pitch applies to musical characteristics).

As per Claim 28-36, Choi teaches wherein the setting means stores a formant change table that changes the formant non-uniformly and sets the modulation levels based on the change table ("selected effect", paragraph 19; "cave", paragraph 47; where the information for each of the effects must be arranged in memory to be found by the application, and this organized memory is a form of table).

Choi, in view of Cano, fail to teach where the modulation levels correspond to each of the frequency bands.

Gibson suggests where the modulation levels correspond to each of the frequency bands ("signal is split into two equal-width frequency bands... gain compensation... transformed", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; "spectral", col. 9, lines 32-43; where division into frequency bands involves filtering an input spectrum).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi, in view of Cano, to include the teaching of Gibson of where the modulation levels correspond to each of the frequency bands, in order to transform voices with reduced computational demands, as described by Gibson (col. 9, lines 62-65).

As per Claim 39, its limitations are similar to those in Claim 2, and so is rejected under similar rationale.

As per Claim 40, its limitations are similar to those in Claim 3, and so is rejected under similar rationale.

As per Claim 41, Choi teaches wherein the first musical tone signal is produced by a male voice or a female voice ("voice", paragraph 4; where voices by a human are either male or female).

As per Claim 42, Choi, in view of Cano, fail to teach wherein the level of the signal of each of the frequency bands modulated by the modulation means is an amplitude of the signal.

Gibson suggests division wherein the level of the signal of each of the frequency bands modulated by the modulation means is an amplitude of the signal ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; gains affect amplitudes of a spectrum).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice

changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

As per Claim 43, Choi, in view of Cano, fail to teach wherein, in the modulation means, the center frequencies of the frequency bands are maintained as fixed in the division means.

Gibson suggests wherein, in the modulation means, the center frequencies of the frequency bands are maintained as fixed in the division means ("signal is split into two equal-width frequency bands... gain compensation... transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; the filters do not change the frequency range that they occupy, and so their center frequencies do not change either).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

As per Claims 44, Choi fails to teach wherein the setting means sets the modulation levels by using a polynomial interpolation.

Cano teaches wherein the setting means sets the modulation levels by using a polynomial interpolation ("target singer", Introduction; "interpolated", Section 2; where the use of polynomial interpolations are an obvious to one of ordinary skill in the art as a type of interpolation that can be used to convert voices).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice

changing technique of Gibson because Choi teaches **the prior art contained** a voice changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

As per Claim 45, Choi, in view of Cano, fail to teach wherein the center frequencies of the modulated signals of the frequency bands are equal to the respective center frequencies of the frequency bands, as fixed by the division means.

Gibson suggests wherein the center frequencies of the modulated signals of the frequency bands are equal to the respective center frequencies of the frequency bands, as fixed by the division means ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; the filters do not

change the frequency range that they occupy, and so their center frequencies do not change either).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

As per Claim 46, Choi teaches wherein the first musical tone signal is a speech signal ("voice", paragraph 4).

As per Claim 47, Choi fails to teach wherein the setting means sets the modulation level by interpolation processing based on the formant characteristics at a plurality of frequencies.

Cano teaches wherein the setting means sets the modulation level by interpolation processing based on the formant characteristics at a plurality of frequencies ("target singer", Introduction; "interpolated", Section 2; where the use of polynomial interpolations are an obvious to one of ordinary skill in the art as a type of interpolation that can be used to convert voices).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi to include the teaching of Cano of wherein the setting means sets the modulation level by interpolation processing based on the formant characteristics at a plurality of frequencies, in order to extend voice changing to singing applications, as described by Cano (Introduction).

Choi, in view of Cano, fail to teach the modulation level is set at the fixed center frequency of at least one of the frequency bands.

Gibson suggests the modulation level is set at the fixed center frequency of at least one of the frequency bands ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; the filters do not change the frequency range that they occupy, and so their center frequencies do not change either).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice

changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

As per Claims 48, Choi fails to teach wherein the setting means sets the modulation levels by using a polynomial interpolation of the formant characteristics at a plurality of frequencies.

Cano teaches wherein the setting means sets the modulation levels by using a polynomial interpolation of the formant characteristics at a plurality of frequencies ("target singer", Introduction; "interpolated", Section 2; where the use of polynomial interpolations are an obvious to one of ordinary skill in the art as a type of interpolation that can be used to convert voices).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi to include the teaching of Cano of wherein the setting

means sets the modulation levels by using a polynomial interpolation, in order to extend voice changing to singing applications, as described by Cano (Introduction).

Choi, in view of Cano, fail to teach wherein the modulation levels are set at the fixed center frequency of at least one of the frequency bands.

Gibson suggests wherein the modulation levels are set at the fixed center frequency of at least one of the frequency bands ("signal is split into two equal-width frequency bands... gain compensation... transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; the filters do not change the frequency range that they occupy, and so their center frequencies do not change either).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing on different frequency bands **to obtain the predictable results** of a voice changer that

processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

As per Claim 53, Choi teaches a formant changer for changing the formant characteristics detected by the formant detector, the formant changer for changing the formant characteristics based on the formant control information ("selects the kind of the effect... converts the spectrum parameter… with reference to the loaded spectrum parameter…conversion of the spectrum parameter... height of voice", paragraph 47; "modulating", paragraph 38; where manipulating the spectrum changes the frequency values which includes the formants that make up the frequency values, and the change is based on the desired effect [format control information] which tells the system how to change the voice/formants).

3. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi (US 2003/0014246), in view of Cano et al. ("Voice Morphing System for Impersonating in Karaoke Applications"), hereafter Cano, Gibson et al. (US 6,336,092), and Flanagan (US 4,374,304) and Kikumoto.

As per Claim 52, Choi teaches a vocoder system comprising: formant detection means for analyzing a first tone signal to detect formant characteristics of the first tone signal ("voice signal of the subscriber… detect the spectrum parameter", paragraph 46;

"spectrum parameter… are detected", paragraph 47; where the spectrum of a signal comprises, among other things, the formants of a voice)

tone signal input means for inputting a second tone signal that corresponds to specified pitch information ("selects the kind of the effect... converts the spectrum parameter… with reference to the loaded spectrum parameter…conversion of the spectrum parameter... height of voice", paragraph 47)

setting means for setting modulation levels based on the formant characteristics and formant control information with which the formant characteristics detected by the formant detection means are changed ("selects the kind of the effect... converts the spectrum parameter… with reference to the loaded spectrum parameter…conversion of the spectrum parameter... height of voice", paragraph 47; "modulating", paragraph 38)

modulation means for modulating a level of a signal based on the modulation level set in the setting means ("modulating", paragraph 38).

Choi fails to teach the tone signals are musical tone signals.

Cano teaches the tone signals are musical tone signals ("target singer", Introduction).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Choi to include the teaching of Cano of the tone signals are musical tone signals, in order to extend voice changing to singing applications, as described by Cano (Introduction).

Choi, in view of Cano, fail to teach filtering means for dividing the second musical tone signal into a plurality of frequency bands where the modulation levels are set at the

fixed center frequency of each of the frequency bands, and where modulating the level of a signal modulates levels of each of the frequency bands.

Gibson suggests division means for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed, where the modulation levels are set at the fixed center frequency of each of the frequency bands, and where modulating the level of a signal modulates levels of each of the frequency bands ("signal is split into two equal-width frequency bands… gain compensation… transformed ", col. 9, lines 44-65; "summing a gain-compensated high-frequency signal and the transformed low-frequency component", col. 9, line 65 – col. 10, line 2; "source and target voice signals", col. 7, lines 17-28; where, to determine the target voice characteristics and the necessary transformations, an analysis of the target voice signals in the corresponding frequency bands is obvious/necessary).

Therefore, it would have been obvious to one of ordinary skill in the art to perform a simple substitution of Choi's voice changing technique with the sub-band-based voice changing technique of Gibson because Choi teaches **the prior art contained** a voice changing **device which differed from the claimed device by the substitution** of whatever Choi's voice changing process was with a voice changer that operates separately on different frequency bands. Gibson teaches that the **substituted components** of a voice changer that operates separately on different frequency bands **was known in the art. One of ordinary skill in the art could have substituted** Choi's voice changer that does not necessarily perform separate processing on different frequency bands with Gibson's voice changer that does perform separate processing

on different frequency bands **to obtain the predictable results** of a voice changer that processes different frequency bands separately (and consequently performs different modulations on the different frequency bands).

Choi, in view of Cano and Gibson, fail to teach where the division is based on respective fixed center frequencies.

Flanagan teaches where the division is based on respective fixed center frequencies ("partition the received signal into subbands having center frequencies", col. 8, lines 44-62; where Flanagan teaches that the division of a signal into subbands can be based on what the center frequencies are).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to perform a simple substitution of Gibson's subband division with Flanagan's subband division based on specific center frequencies, because Gibson teaches subband division that differs from the claimed invention based on an element taught in Flanagan (i.e. where the division is based on center frequencies), and one of ordinary skill in the art could have substituted Gibson's band division with Flanagan's center-frequency based division/partitioning to obtain the predictable results of a system that produces a signal divided into different subbands and analyzed on a sub-band basis.

Choi, in view of Cano, Gibson, and Flanagan, fail to teach that the modulation levels are set only at the fixed center frequencies.

Kikumoto teaches the modulation levels are set only at the fixed center frequencies ("combining section, the sine waves of said center frequencies of each of

the frequency bands... are modulated", col. 2, line 40 – col. 3, line 17, especially col. 2, line 64 – col. 3, line 6; where Kikumoto teaches an alternative audio signal modulation technique that operates by modulating only the frequencies of the center frequencies of different frequency bands).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to perform a **simple substitution** of Choi's modulation technique which at the very least processes all frequencies in the frequency band of the audio signal, **which differs from the claimed device** by the **substitution of** modulation performed by only modulating center frequencies. Kikumoto teaches **the substituted components** of modulating only center frequencies **were known in the art**. **One of ordinary skill in the art could have substituted** Choi's modulation of all frequencies with Kikumoto's modulation of only center frequencies **to obtain the predictable results** of a voice changing system that modulates audio signals.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERIC YEN whose telephone number is (571)272-4249. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on 571-272-7602. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

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EY 5/28/10
/Eric Yen/
Examiner, Art Unit 2626